Replacement Battery Cables for 84/85 RX-7s

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Much has been written about the troublesome battery cables that are on first generation RX-7s. Perhaps the best description of the problem that I've ever seen is David Lane's write up at http://www.nellump.net/peri/epi/gen7Techs/starters.html. I'd strongly suggest reading it when you have the time. But I'll offer an executive summary right here: the battery cables on our 18+ year old cars are subject to internal corrosion such that, eventually, they can't carry the amperage that the starting, ignition and accessory electrical systems need to function properly. The result is one or more of the following symptoms: difficult starting, where the engine turns but won't fire; frequent flooding as a result of either slow cranking or a weak ignition system or both; low voltage displayed on the dash meter; excessive dimming of the headlights or interior lights or slow power window cranking, particularly at idle; even a somewhat "less than lively engine" (slightly low on power), again, as a result of an ignition system that isn't getting a full supply of electrons to work with. The cables may test fine with an ohm meter, but that only tells you that there is at least one strand of wire left within the cable that can carry electricity from one end to the other. The ohm meter won't tell you whether or not the cable can successfully carry the full amperage required to power the starter or any of the other systems that I mentioned earlier.

Explaining all of these symptoms is not the purpose of this page. Handing you a quick and easy solution is. Therefore, I took it upon myself to record some part numbers for the Exide battery cables that I have used on three GSL-SEs and a friend has used on a fourth. I know that they fit, and I know that they require a minimum of technical skills to properly wire them up. (You will need to be able to splice wires together to connect the fusible link lead to the new battery cable.) I'll mention here that many shade tree mechanics choose to purchase "car stereo installer type" gold plated terminal cables, and I do consider them to be an excellent solution for anyone planning to install aftermarket electrical accessories like a gigawatt stereo or an aftermarket ignition system or an alarm system . But most of us are not looking for anything more than restoring OEM functionality quickly and cheaply. So....

I last purchased these items at a local Pep Boy's store in 2/01. All of them, except where noted below, are packaged and marketed as Exide brand products, which is a very popular brand that I'm sure you can find at many other retailers and mail order vendors. To help you order the correct parts, I have listed the description as it appears on the Exide packaging, as well as the Exide part number, and the price that I paid at Pep Boys. Total it up and you'll get about $20. That's a whole bunch cheaper than a new starter, new battery, etc., etc. Just for comparison, the MazdaTrix price on the OEM cables is about $85. I expect the dealer prices to be about the same, and I seem to recall that even Mazda's Competition Parts department quoted me something in the neighborhood of $62. (Check that if you have that resource available, and please let me know what they told you.)

Description on Exide Packaging	Exide Part Number	Price Each
Terminal Caps	7000150 (or B150CPE?)	2.49

Battery Cable 4 Gauge 50" Top Post	2010451	5.99
Battery Cable 4 Gauge 24" Top Post	2010424	3.79
Battery Cable Switch to Start 4 Gauge 24"	2230424	3.29
Battery Cable Switch to Start 4 Gauge 40"	2230440	3.99
6 x 1.0 x 20 mm bolt	Conduct-Tite #85215	check your "box o'nuts 'n' bolts"
12-10 gauge 1/4" ring terminal, crimp on (2 per package)		I dunno -- cheap, though.
	Total Price before local taxes	$ 19.55

As far as installation is concerned, I'll assume that you're not so green that you don't know to disconnect cables from the battery before playing with this stuff, and I'll just describe the fine points as I remember them. If you need more help than this, pick up a Mazda shop manual or pay somebody to do the job. If you're not 100% confident in your ability to do this job right -- DON'T! A minor mishap with this wiring could result in electrical burns to your person, or an exploding battery or even a car fire.

The terminal covers are pretty much a no-brainer, but I'll mention that I cut a slit in the bottom of each terminal cover to make it easier to install and remove them whenever I needed to. Jump starting a friend's GSL-SE (with not-yet-replaced battery cables) is an example of one time you might need to pull the covers out of the way. :)

The 50" cable runs from the battery to the starter, and also has a smaller gauge pigtail that you'll need to take some extra steps to mate it with the fusible link box(es). (The 84/85 12a, manual transmission cars have a single fusible link box, and the GSL-SE models have two fusible link boxes. I don't know how/if this differs earlier models.) For my GSL-SEs, I spliced on two extra lengths of similar gauge wire, mimicking the "m" shape on the original Mazda positive cable, and then crimped the ring terminals onto the ends. (Another tip: make a nice splice by using a high-wattage soldering iron and using shrink wrap tubing. Wire of this gauge will not solder properly with a little 20-watt soldering pen. You can get the requisite tools and materials from Radio Shack, and you should have these tools and skills anyway if you're going to keep a 17+ year old sports car on the road. They *probably* even have a pamphlet that will teach you good wiring and soldering techniques. Ask at the counter.)

Also regarding that 50" cable, the starter end of the Exide part has a straight end to bolt to the starter terminal. But the OEM part has a 90 degree bend in the end. You'll want to mimic this bend in order to keep this positive terminal-end from contacting the car's negative ground chassis. (That would be bad -- remember what I said about exploding batteries and car fires?) Also, take the rubber insulator off of the OEM part, and slide it over the new cable. You can't be too careful with this stuff.

The 24" top post cable will connect the negative battery post to the body ground at the strut tower. The 40 inch 'switch to starter' cable will connect from there to the back of the engine where the original negative cable went. These two make up the equivalent of the OEM negative cable.

The remaining 24 inch 'switch to starter' cable should be used as a secondary ground to the engine. I'd suggest running it from the strut tower ground to either the alternator bracket or to a point on the side of the engine, near the front end housing. (On the most recent installation, I used a 40 inch version of this cable -- same as above -- to route it down along the strut tower, across the chassis cross member, and up along the side of the engine to the top of the alternator bracket. A friend of mine did something similar with a 30 inch version of this cable.) Everyone that I know who has added a supplementary ground cable has reported consistently higher voltage on their stock voltmeter than they saw before doing this modification. (On my old '84 GSL-SE, I have recorded an increase from about 12.4 volts to 14.2 volts at idle. My current GSL-SE gets a consistent 14.68 volts, and the idle *doesn't even change when the air conditioning is switched on!*) Along with that higher voltage, I noticed that the engine was more willing to rev and it seemed to run more smoothly at all loads and engine speeds -- all of which is consistent with an ignition system that is getting more juice. Also, my headlights wouldn't dim when I came to a stoplight, and the interior lights were brighter. In any case, for three bucks and change, it's a no-brainer to beef up your electrical system with this additional cable.

In all three of the cable replacements that I've done to date, I found that the strut tower cable mounting screw was a real pain to get back into it's hole. The threads just didn't seem to want to hook up. That was the single worst part of the job, and it added about 20 minutes of frustration to an otherwise straightforward, should-have-been-30-minutes job. Also, with the added thickness of two additional negative cables, versus the single eyelet grounding point of the original negative cable, it would be smart to replace the mounting screw with the longer sized, 20mm bolt listed above. Replacing this bolt with a similar sized stud and nuts would probably be wise, although I haven't done this on any installations to date.

Hopefully, this will help you order and install the correct cables to bring your car's primary electrical system back to peak health.

PROBLEMS ASSOCIATED WITH BATTERY CABLES

When a battery cable goes bad, or a connection gets dirty, the effect is like an electrical traffic jam. The cables can't pass electricity fast enough to power the starter motor. Thus, when you turn the key, you hear a loud click from the solenoid, but there is not enough current to crank the engine.

The first task is to clean all connections associated with the cables. For safety, remove both cables at the battery before proceeding. Otherwise, you risk handling live cables, and the results can be a shower of sparks. Put the front of the car up on jack stands, or a ramp. Do not rely on a jack alone if you are under the car.

The first connection to check is the positive battery cable, where it terminates at the solenoid (located on the starter motor). The battery cable is the one on the left, covered with a rubber boot. Remove the cable and sand the connecting surface until it is bright. Replace the cable. While you are working in that area, you will notice a smaller wire terminating with a clip connector on the solenoid. This carries electricity from the ignition circuit, activating the solenoid when you turn the key. Might as well pull it off and clean up the post. You can also squeeze the female end attached to the wire if it no longer makes a tight connection.

While you are looking at the aft end of the solenoid, consider that the two large terminal posts are the ones connected by the metal plate when the solenoid is activated. If you look carefully, and have enough light, you will be able to see that the large post on the right has a wire attached to it which runs into the starter motor. Now let's go to the negative battery cable -- the ground strap.

The ground strap is part of every electrical circuit in the car, so if it is internally corroded, or if the connections are dirty, everything will be affected to one extent or another. This includes lights, starting, and other things we don't usually think of, such as engine management computers and the various relays and small solenoids which serve switching and control functions. Some of these systems are mounted to the body. Others are mounted to the engine, so the ground strap is connected to both. As you can tell by the thickness of the wire going to the starter solenoid, powering the starter motor requires more electrical flow than any other electrical function, so any weakness in the ground strap is likely to show up there first.

The ground strap is connected to the engine. Mid-way down the cable is the connection to the body -- typically part way down the driver's side shock tower. Remove the connections, sand until bright (including the mating surface in the shock tower), and replace. Third generations cars have another ground strap from the exhaust to the body. While a fault at this connection will not cause a starting problem, some owners have reported problems if this cable is not clean and solid.

Replace the connections at the battery, and try to start the car.

ADDITIONAL INFORMATION

If this doesn't fix the problem, the next step is to test for internal corrosion in the cables. There is some possibility that the cables are corroded, but in the process of cleaning the terminals, you have caused enough internal friction to rub away some of the corrosion. In this case, the car might start, but exhibit the same problem at a later time. When the cables crud up internally, it is hidden underneath the insulation. Also, you can't test for corrosion with a volt meter because even a badly corroded cable will provide plenty of voltage to produce a reasonable reading. The best approach is to substitute a jumper cable (the ones you might use to jump start the car with a dead battery) for the cable you want to test. Here is how:

To test the ground strap, first disconnect the ground strap at the battery to expose the negative battery post. Connect one end of your jumper to a clean, unpainted place on the engine. Connect the other end to the negative battery post. Try to start the car. If you have no luck with that, remove the jumper cable from the engine and connect it to the body via an unpainted bolt or other piece of unpainted metal. Try to start the car again. If the car starts in either case, you need a new ground strap. You can get something close at a local parts store, or get the genuine Mazda part from Mazdatrix or your usual source of parts. It saves time to use a Mazda part because it has provisions for the body and engine connections. If the car doesn't respond to substituting a jumper cable for the ground strap, move on to the positive battery cable.

Testing the positive battery cable is a little more tricky. We want to avoid sparks, so the first thing to do is to remove the positive battery cable at the battery. Next, clamp one end of your jumper cable to the left hand post at the solenoid (where the stock cable is connected). Be very sure the clamp is ONLY touching the terminal post (including the stuff connected to it) and NOT anything else. Nothing on the body, nothing on the engine, nothing on the starter motor. Any contact with a ground such as those mentioned will result in a shower of sparks when you connect the jumper cable at the battery. To double check that you have a clean connection at the starter, bring the other end of the cable near the positive battery terminal and quickly brush it across. If you get no reaction, it is safe to clip it to the battery terminal. If you get sparks, recheck the connection at the solenoid. Once the jumper is in place, try to start the car. If the car starts, replace both battery cables (the negative cable, if not bad already, will go bad soon).

If the car still won't crank and you still get the click from the solenoid when you turn the key on, the problem is probably within the solenoid or the starter motor itself. You can check the solenoid with a test light or volt meter by clipping one connector to a ground on the engine or body, and the other to the right hand terminal on the solenoid (the one with the wire leading inside the starter motor). All connections of the battery cables are normal for this test. Turn the key to start. If the solenoid is good, you should see twelve volts or so on the meter. If you are using a test light, it should illuminate. If the solenoid seems good, it may be time to pull the starter motor and have it checked.